Docket No.: *1509-423* **PATENT**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	
BERESNEVICHIENE, Yolanta	:	
U.S. Patent Application No. 10/611,424	:	Group Art Unit: 3629
Filed: July 2, 2003	:	Examiner:

For: IMPROVEMENTS IN AND RELATING TO APPARATUS AND METHODS FOR ANALYSING ELECTRONIC REPRESENTATIONS OF BUSINESS PROCESSES

TRANSMITTAL OF CERTIFIED PRIORITY DOCUMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

At the time the above application was filed, priority was claimed based on the following application(s):

Great Britain Application No. 0215201.5, filed July 2, 2002.

A copy of the priority application is enclosed.

Respectfully submitted,

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1. Your reference — 300110455-1 GB

2. [illegible] 0215201.5 — 2 JUL 2002

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

Hewlett-Packard Company
3000 Hanover Street
Palo Alto
CA 94304, USA

Patents ADP number *(if you know it)*

Delaware, USA

If the applicant is a corporate body, give the country/state of its incorporation

4965880 01

4. Title of the invention

Improvements In and Relating to Apparatus and Methods for Analysing Electronic Representations of Business Processes

5. Name of your agent *(if you have one)*

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

Richard A. Lawrence
Hewlett-Packard Ltd, IP Section
Filton Road, Stoke Gifford
Bristol BS34 8QZ

Patents ADP number *(if you know it)*

7448038001

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number

Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application	Date of filing *(day / month / year)*

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Statement of inventorship and right to grant of a patent *(Patents Form 7/77)*	1 ✓
Request for preliminary examination and search *(Patents Form 9/77)*	1 ✓
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11. I/We request the grant of a patent on the basis of this application.

Signature Richard A. Lawrence Date 1/7/02

12. Name and daytime telephone number of person to contact in the United Kingdom

Meg Joyce Tel: 0117-312-9068

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Improvements In and Relating to Apparatus and Methods for Analysing Electronic Representations of Business Processes

The present invention relates to apparatus and methods for analysing electronic representations of business processes, and to corresponding computer apparatus operating computer programs for operating such methods.

In most business processes, such as manufacturing operations, business to business transactions, quality control reviews etc the ability to hold individuals accountable for process steps or transactions is important. Hence, adequate accountability assurances must be provided in business processes, especially given the malleable nature of digital electronic records. Currently, business flow processes in electronic form are hard-coded according to specific business needs in applications such as LOTUS NOTES (trade mark). In these applications process steps are normally described in free text terms input by a system administrator, process manager or the like. The absence of a ready mechanism for tracing accountability and verifying business process history increases the legal risks facing participants of business processes. This is particularly the case for financial business transactions.

It is an aim of preferred embodiments of the present invention to obviate or overcome a disadvantage of the prior art, whether referred to herein or otherwise.

According to the present invention in a first aspect, there is provided an apparatus for analysing an electronic representation of a business process, the apparatus

comprising a rules database including at least one process rule for at least one process step, and a process analyser for determining whether a process step complies with the at least one process rule of the rules database and outputting a result based on the determination of whether the business process step complies with the at least one process rule.

Suitably, at least one process step is associated with at least one predetermined process rule. Suitably, the rules database comprises data of a process step that will satisfy a predetermined process rule. A given process step can satisfy a given process rule if the process step has associated with it another process step, which may be a sub-step, that satisfies the requirement of the process rule.

Suitably, the rules database comprises a plurality of process rules and the process analyser is configured to determine whether a process step complies with all applicable process rules. Not all process rules will necessarily be applicable to a given process. Suitably, the rules database comprises a plurality of process rules for a plurality of process steps. The plurality of process rules need not be of the same number as the plurality of process steps.

Suitably, the apparatus further comprises a reporter for reporting the result of the process analyser. The result may be generated as a digital file and, optionally, printed.

Suitably, the apparatus further comprises a process modifier for modifying a process step of the electronic representation of the business process to comply with at least one process rule of the rules database when it is determined by the process analyser that a rule is not complied with. Suitably, the rules database comprises a process modification database including a predetermined process modification for compliance with a given process rule. The modification may be a change, an addition, a deletion, or a combination of these.

Suitably, the rules database includes a process accountability rule. Suitably, the rules database specifies that a given process step shall include a digital signature. Suitably, the rules database specifies that a given process step shall include a time stamp. These are methods of ensuring process accountability.

Suitably, the rules database includes a process non-repudiation rule. Suitably, the rules database specifies that a given process step including a digital signature shall include a verification of the digital signature. This is one method of ensuring process non-repudiation.

Thus, there is provided apparatus for modifying an electronic representation of a business process using the apparatus referred to above.

According to the present invention in a second aspect, there is provided a method for analysing an electronic representation of a business process, the method comprising the steps of providing access to a rules database including at least one process rule for at least

one process step and determining whether a process step complies with at least one process rule of the rules database and outputting a result based on the determination of whether the at least one process step complies with the at least one process rule.

Suitably, at least one process step is associated with at least one predetermined process rule. Suitably, the rules database comprises data of a process step that will satisfy a predetermined process rule.

Suitably, the rules database comprises a plurality of process rules and the method comprises the step of determining whether the at least one business process step complies with all applicable process rules, and outputting a result based on said determination. Suitably, the rules database comprises a plurality of process rules for a plurality of process steps.

Suitably, the method comprises the further step of reporting the result of the process analyser. The result may be generated as a digital file and, optionally, printed.

Suitably, the method further comprises the step of modifying a process step of the electronic representation of the business process to comply with the rules database. Suitably, the rules database comprises a predetermined process modification for compliance with a given rule. The modification may be a change, an addition, a deletion, or a combination of these.

Suitably, the rules database includes a process accountability rule. Suitably, the rules database specifies that a given process step shall include a digital signature. This is one method of ensuring process accountability. Another is that the rules database may specify that a given process step shall include a time stamp operation.

Suitably, the rules database includes a process non-repudiation rule. Suitably, the rules database specifies that a transaction type including a digital signature shall include a verification of the digital signature. This is one method of ensuring process non-repudiation.

According to the present invention in a third aspect there is provided a computer apparatus programmed to carrying out the method of the second aspect of the present invention.

A rule in the rules database can apply to more than one business process type. A given business process type can have none, one or a plurality of rules applicable to it. Not all business process types will have applicable rules.

The present invention will now be described, by way of example only, with reference to the drawings that follow; in which:

Figure 1 is a schematic illustration of a business process and an apparatus according to the present invention.

Figure 2 is a functional flow diagram illustrating operation of an embodiment of the present invention.

Figure 3 is a schematic illustration of the business process of Figure 1 after modification by the present invention.

Referring to the accompanying drawings, there is shown a business process apparatus 2 for analysing electronic representations of business processes, the apparatus 2 comprising a business process rules database 4, business process analyser 6, a reporter 8 and a business process modifier 10. Typically the business process apparatus 2 will be embodied in a digital computer (of which apparatus 2 is a schematic representation) operating under the control of a computer program according to embodiments of the present invention.

A business process may be represented in electronic format by a computer software application such as LOTUS NOTES (trade mark) and is illustrated schematically by reference numeral 12 in Figure 1. In the business process shown in Figure 1, there are three process steps T_1, T_2 and T_3. As will be appreciated by those skilled in the art, most business processes involve many more steps, but the present invention can be explained with reference to just a few such steps, which may form a sub-step of a larger business process. In the present example step T_1 is a cheque being issued, perhaps in response to an invoice; step T_2 is a cheque being approved and step T_3 is the cheque being dispatched to the payee. Step T_3 has attached to it the requirement that the cheque approval of step T_2 must be digitally signed.

A task scheduler 14 monitors and governs the operation of the business process 12.

The rules database 4 contains rules for accountability and non-repudiation within a business process. Examples of business process rules in rules database 4 are:

Rule 1 - cheque approvals must be digitally signed by the signer.

Rule 2 - digital signatures must be verified by a trusted third party.

These rules relate to accountability and non-repudiation in a business process, for which embodiments of the present invention are especially useful.

Referring to Figure 2 of the drawings that follow, the application of the rules in rules database 4 in a method according to an embodiment of the present invention is described using the business process 12 referred to above.

In order for the process analyser 6 to compare the business process steps to the requirements of rules database 4, a business process needs to be set up according to certain guidelines. Normally, in the prior art, as the process steps are input in free text form and so are unsuitable for reliable computerised analysis. Accordingly, there are provided predetermined business processes to which corresponding rules are applied. Thus, a business process application in which a business process is modelled is provided with a core set of predetermined business processes a user can select, typically via a drop down menu. The predetermined business processes available

have associated with them business process rule in rules database 4. Not all business processes will have corresponding process rules and some business processes may have several process rules associated with them.

In an alternative mechanism, business processes may be generated in a free text or other format and the user will then associate either no process rule, a process rule or several process rules with them. In generating a digital representation of a business process a user is given the option for each process step of associating none, one or more business process rules with that process. If a business process is added in this way, it also needs to be specified whether as a process step it satisfies the requirements of a process rule.

Thus in step 18 of Figure 2 predetermined process rules from rules database 4 are associated with process steps of business process 12. As a minimum one process step has one process rule associated with it, but generally many process steps in a business process will have process rules applied to them.

In the present example, process T, has no process rule associated with it, business step T_2 has a requirement for a digital signature (Rule 1) as a process rule associated with it, and business step T_3 is entered by a user and a process rule requiring third party verification of a digital signature is selected (Rule 2) from rules database 4.

Also in process rules database 4 are the following business processes:

T_4 - Apply digital signature

T_5 - Verify digital signature with third party.

Step T4 is indicated as satisfying Rule 1 and step T5 is indicated as satisfying Rule 2. It will be appreciated that some process steps may require several other process steps to be associated with them (sub-steps, in effect) to satisfy a process rule.

In step 20 the first process step T_1 of the business process 12 is analysed by process analyser 6. In step 22 it is determined by process analyser 6 whether the process step T_1 complies with the business process rules of rules database 4. Process analyser 6 checks the business process step in the relevant process step with the rules relating to that previous step in rules database 4 to determine whether the relevant rule requirements are met. This can be a simple look-up table, a relational database etc.

In this example, the step of issuing a cheque does not have a relevant rule requirement in rules database 4 so all rule conditions are met and the process proceeds in step 24 to the next process step T_2, which is analysed in step 20. In step 22 it is determined whether process T_2 complies with the relevant rules in rules database 4.

The step of approving a cheque is a process step type to which a rule in rules database 4 applies, in this case that the approval must be digitally signed. If the business process step T_2 complies with the relevant rule, the process proceeds to step 24 and moves to analyse the

next process step T_3. To comply with the relevant rule process step T_4 needs to be present in relation to process step T_3. However, in the business process 12 of Figure 1 the step T_2 of approving a cheque does not have a requirement of applying a digital signature attached to it so the method proceeds to step 26 in which a process modifier is issued. In the case of the analysis of business process 12 this can be issued as a report or message by reporter 8. Alternatively or in addition the business process 12 can be modified by business process modifier 10 in step 28 to insert the process step T_4 requirement that the step T_2 be digitally signed. To do this the business process analyser 2 instructs task scheduler 14 to insert in the business process 12 the new process step T_4, which is a predetermined process step to be inserted if Rule 1 above is not met. Thus there is a predetermined modification (requiring a digital signature) for compliance with a given rule (Rule 1).

In either case, the method proceeds via step 24 to the third business process step T_3 in which the step is that of sending the cheque to a payee and as a prerequisite that a digital signature must be attached to the cheque approved from step T_2. However, at step 22 it is determined in relation to T_3 that the step of checking for a digital signature does not include the process step T_5 of verifying the digital signature as required by Rule 2 above, which additional step is issued as a task modifier in step 26 and optionally used to modify the business process in step 28 by the addition of step T_5 as described above to step T_3.

A modified business process 12A after operation of this embodiment of the present invention is set out in Figure 3 of the drawings that follow in which additional process steps T_4 and T_5 appear.

Any process step may include sub-steps therein.

Thus, using embodiments of the present invention, electronic representations of business processes can be analysed against predetermined rules. If processes to meet the rule requirements are missing reports can be generated and/or the process can be modified automatically to comply with the relevant rule or rules.

The reader's attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

Each feature disclosed in this specification (including any accompanying claims, abstract and drawings), may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each

feature disclosed is one example only of a generic series of equivalent or similar features.

The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

Claims

1. An apparatus for analysing an electronic representation of a business process, the apparatus comprising a rules database including at least one process rule for at least one process step, and a process analyser for determining whether a process step complies with the at least one process rule of the rules database and outputting a result based on the determination of whether the business process step complies with the at least one process rule.

2. An apparatus for analysing an electronic representation of a business process according to claim 1, in which at least one process step is associated with at least one predetermined process rule.

3. An apparatus for analysing an electronic representation of a business process according to claim 2, in which the rules database comprises data of a process step that will satisfy a predetermined process rule.

4. An apparatus for analysing an electronic representation of a business process according to any preceding claim, in which the rules database comprises a plurality of process rules and the process analyser is configured to determine whether a process step complies with all applicable process rules.

5. An apparatus for analysing an electronic representation of a business process according to claim 4, in which the rules database comprises a plurality of process rules for a plurality of process steps.

6. An apparatus for analysing an electronic representation of a business process according to any preceding claim, in which the apparatus further comprises a reporter for reporting the result of the process analyser.

7. An apparatus for analysing an electronic representation of a business process according to claim 6, in which the report is generated as a digital file.

8. An apparatus for analysing an electronic representation of a business process according to claim 6 or claim 7, in which the report is printed.

9. An apparatus for analysing an electronic representation of a business process according to any preceding claim, in which the apparatus further comprises a process modifier for modifying a process step of the electronic representation of the business process to comply with at least one process rule of the rules database when it is determined by the process analyser that a rule is not complied with.

10. An apparatus for analysing an electronic representation of a business process according to claim 9, in which the rules database comprises a

process modification database including a predetermined process modification for compliance with a given process rule.

11. An apparatus for analysing an electronic representation of a business process according to any preceding claim, in which the rules database includes a process accountability rule.

12. An apparatus for analysing an electronic representation of a business process according to claim 11, in which the rules database specifies that a given process step shall include a digital signature.

13. An apparatus for analysing an electronic representation of a business process according to claim 11, in which the rules database specifies that a given process step shall include a time stamp operation.

14. An apparatus for analysing an electronic representation of a business process according to any preceding claim, in which the rules database includes a process non-repudiation rule.

15. An apparatus for analysing an electronic representation of a business process according to claim 14, in which the rules database specifies that a given process step including a digital signature shall include a verification of the digital signature.

16. A method for analysing an electronic representation of a business process, the method comprising the steps of providing access to a rules database including at least one process rule for at least one process step and determining whether a process step complies with at least one process rule of the rules database and outputting a result based on the determination of whether the at least one process step complies with the at least one process rule.

17. A method for analysing an electronic representation of a business process according to claim 16, in which at least one process step is associated with at least one predetermined process rule.

18. A method for analysing an electronic representation of a business process according to claim 17, in which the rules database comprises data of a process step that will satisfy a predetermined process rule.

19. A method for analysing an electronic representation of a business process according to any one of claims 16 to 18, in which the rules database comprises a plurality of process rules and the method comprises the step of determining whether the at least one business process step complies with all applicable process rules, and outputting a result based on said determination.

20. A method for analysing an electronic representation of a business process according to claim 19, in which the rules database comprises a plurality of process rules for a plurality of process steps.

21. A method for analysing an electronic representation of a business process according to any one of claims 16 to 20, in which the method comprises the further step of reporting the result of the process analyser.

22. A method for analysing an electronic representation of a business process according to claim 21, in which the result is generated as a digital file.

23. A method for analysing an electronic representation of a business process according to claim 21 or claim 22, in which the result is printed.

24. A method for analysing an electronic representation of a business process according to any one of claims 16 to 23, in which the method further comprises the step of modifying a process step of the electronic representation of the business process to comply with the rules database.

25. A method for analysing an electronic representation of a business process according to claim 24, in which the rules database comprises a predetermined process modification for compliance with a given rule.

26. A method for analysing an electronic representation of a business process according to any one of claims 16 to 25, in which the rules database includes a process accountability rule.

27. A method for analysing an electronic representation of a business process according to claim 26, in which

the rules database specifies that a given process step shall include a digital signature.

28. A method for analysing an electronic representation of a business process according to claim 26, in which the rules database specifies that a given process step shall include a time stamp operation.

29. A method for analysing an electronic representation of a business process according to any one of claims 16 to 28, in which the rules database includes a process non-repudiation rule.

30. A method for analysing an electronic representation of a business process according to claim 29, in which the rules database specifies that a transaction type including a digital signature shall include a verification of the digital signature.

31. A method for analysing an electronic representation of a business process, which method is substantially as described herein.

32. A computer programmed for carrying out the method of any one of claims 16 to 31.

33. An apparatus for analysing an electronic representation of a business process, which apparatus is substantially as described herein, with reference to Figure 1 of the drawings that follow.

ABSTRACT

Improvements In and Relating to Apparatus and Methods for Analysing Electronic Representations of Business Processes

The present invention provides an apparatus (2) for analysing an electronic representation of a business process (12), the apparatus (2) comprising a rules database (4) including at least one process rule for at least one process step, and a process analyser (6) for determining whether a process step complies with the at least one process rule of the rules database (4) and outputting a result based on the determination of whether the business process step complies with the at least one process rule. A corresponding method and computer apparatus operating appropriate software therefor are also disclosed.

Figure 2

FIGURE 1

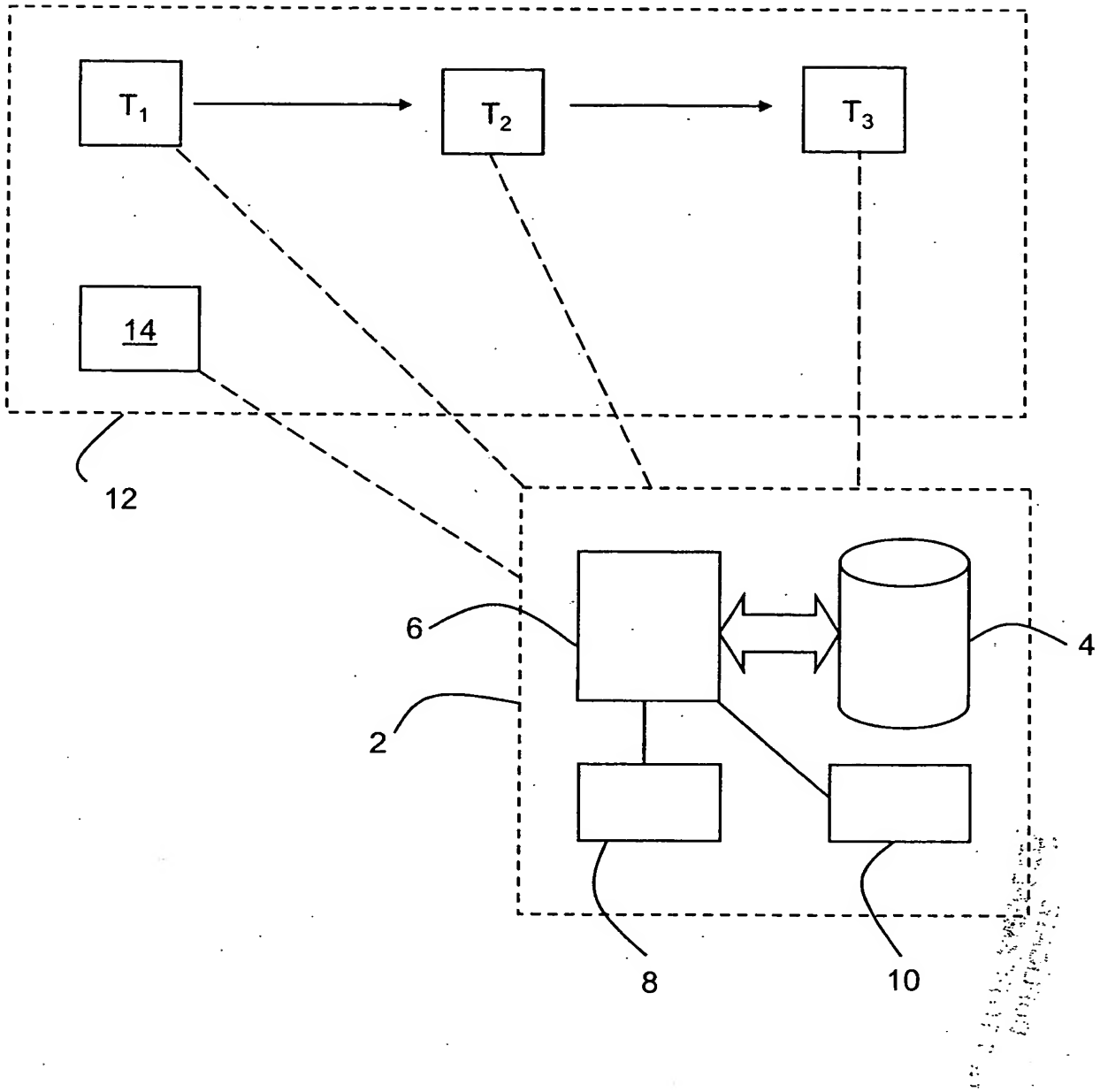

FIGURE 2

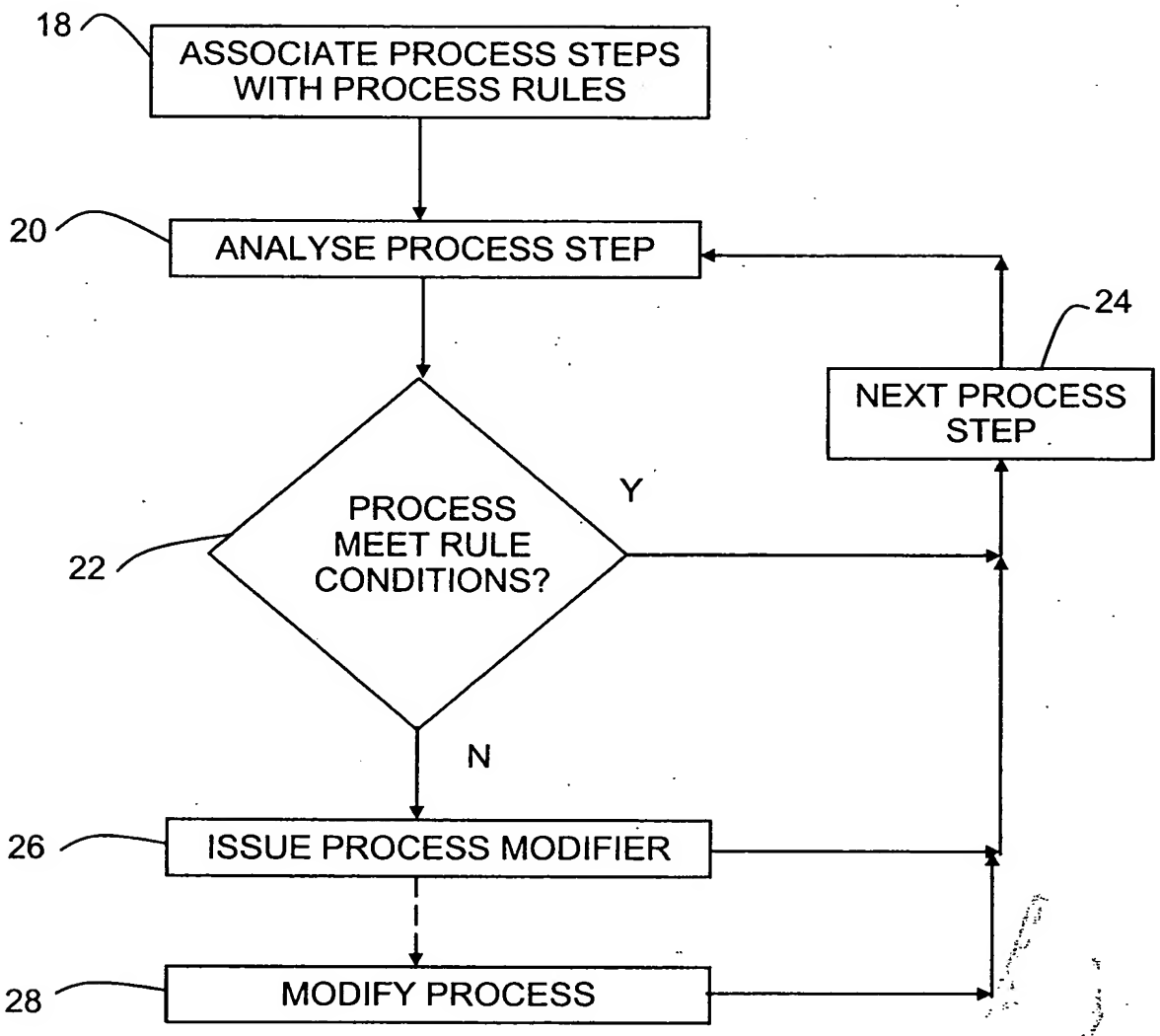
18
ASSOCIATE PROCESS STEPS WITH PROCESS RULES
20
ANALYSE PROCESS STEP
24
NEXT PROCESS STEP
22
PROCESS MEET RULE CONDITIONS?
Y
N
26
ISSUE PROCESS MODIFIER
28
MODIFY PROCESS

FIGURE 3